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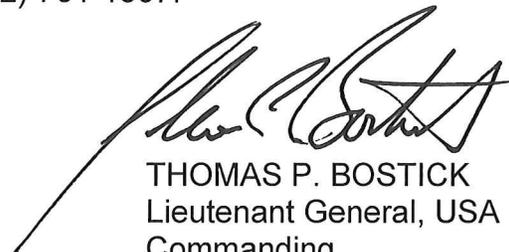
APR 26 2016

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: West Sacramento, California, Flood Risk Management General Reevaluation Report and Environmental Impact Statement\Environmental Impact Report – Final U.S. Army Corps of Engineers (USACE) Response to Independent External Peer Review

1. Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, EC 1165-2-214, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004).
2. The IEPR was conducted by Battelle Memorial Institute. The IEPR panel consisted of four panel members with technical expertise in biology and ecology, economics and Civil Works planning, hydrologic and hydraulic engineering, and geotechnical engineering.
3. The final written responses to the IEPR are hereby approved. The enclosed document contains the final written responses of the Chief of Engineers to the issues raised and the recommendations contained in the IEPR Report. The IEPR Report and the USACE responses have been coordinated with the vertical team and will be posted on the internet, as required in EC 1165-2-214.
4. If you have any questions on this matter, please contact me or have a member of your staff contact Mr. Bradd Schwichtenberg, Deputy Chief, South Pacific Division Regional Integration Team, at (202) 761-1367.

Encl



THOMAS P. BOSTICK
Lieutenant General, USA
Commanding

**West Sacramento, California, Flood Risk Management Project
General Reevaluation Report and Impact Statement/ Environmental Impact Report**

**U.S. Army Corps of Engineers Response to
Independent External Peer Review
March 2016**

Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of WRDA 2007, EC 1165-2-209, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004). The goal of the U.S. Army Corps of Engineers (USACE) Civil Works program is to always provide scientifically sound, sustainable water resources solutions for the nation. The USACE review processes are essential to ensuring project safety and quality of the products USACE provides to the American people.

Battelle Memorial Institute (Battelle), a non-profit science and technology organization with experience in establishing and administering peer review panels for the USACE, was engaged to conduct the IEPR of the West Sacramento, California Flood Risk Management Project General Reevaluation Report and Environmental Impact Statement and Environmental Impact Report (EIS/EIR). The Battelle IEPR panel reviewed the Draft General Reevaluation Report (GRR) and Draft EIS/EIR, as well as supporting documentation. The Final IEPR Battelle Report was issued in February 2015.

Overall, eighteen comments were identified and documented in the IEPR Report. Of the eighteen comments, two were identified as Economics related, six were identified as Geotechnical related, one was identified as Hydraulics related, six were identified as Environmental related and three were identified as Plan Formulation related. One comment was identified as having high significance, two comments were identified as having medium/high significance, eight comments had medium significance, four comments had medium/low significance, and three comments were identified as having low significance.

- 'High': Describes a fundamental problem with the project that could affect the recommendation, success, or justification of the project.
- 'Medium': Affects the completeness of the report in describing the project, but will not affect the recommendation or justification of the project
- 'Low': Affects the understanding or accuracy as described in the report, but will not affect the recommendation or justification of the project.

The following discussions present the USACE Final Response to the Comments.

1. IEPR Comment – *High Significance*. The project benefits are overestimated because the probability of geotechnical failure used in the Hydrologic Engineering Center-Flood Damage Analysis (HEC-FDA) analyses is unreasonably high.

The comment included two recommendations for resolution which were not adopted as discussed below.

USACE Response (#1): Not Adopted

Action Taken: The IEPR Panel recommended estimating geotechnical failure probabilities using a semi-quantitative risk analysis conducted in accordance with USBR (2012). It may be necessary to use expert elicitation to establish a conditional probability relationship between poor performance and levee breach. Case history data may also be informative. This recommendation was not adopted based on the following: The estimate of geotechnical failure probabilities were established according to state of practice for the USACE at the time of the analysis by following Corps guidance, Engineering Technical Letter (ETL) 1110-2-556. ETL 1110-2-556 has never been replaced, so even though it has been “expired” for several years, Corps Districts still use it for Feasibility Studies because new Feasibility Study fragility curve guidance has not been issued. Conditional probabilities were established by conducting an Expert Elicitation which is included as Enclosure 5 of the Geotechnical Appendix.

USACE Response (#2): Not Adopted

Action Taken – The IEPR Panel suggested that the revised failure probabilities should include an assessment of the uncertainty in those probabilities to comply with USACE (2000), Section 10. For example, perform sensitivity studies (such as the example provided in USBR [2012], Section 12) to assist in estimating the uncertainty in calculated failure probability that results from uncertainty in input distributions. This recommendation was not adopted based on the following: The failure probabilities were developed following the current USACE state of practice as defined in Engineering Regulation (ER) 11105-2-101 and ETL 1110-2-556 and did not incorporate a direct uncertainty within the probabilities. During the expert elicitation process, for judgment based probabilities, a range was assigned for each category. For probabilities associated with underseepage, through seepage, and stability analyses, a coefficient of variation is prescribed to each parameter. Those parameters were then varied independently resulting in a probability of poor performance for each of the aforementioned categories. Further evaluation of the uncertainty in the geotechnical performance uncertainty is beyond the requirements of a feasibility study level of analysis.

2. IEPR Comment – *Medium/ High Significance*. Potential flood risk management (FRM) benefits have not been evaluated and project benefits are likely to be significantly greater than presented in the GRR.

The comment includes three recommendations for resolution which were adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended to calculate FRM benefits that would be expected in West Sacramento due to reduced emergency costs and include them in the benefit-to-cost ratio.

USACE Response (#2): Adopted

Action Taken: The IEPR Panel recommended calculation of FRM benefits that would result from reduced agricultural flood damages and include them in the benefit-to-cost ratio.

USACE Response (#3): Adopted

Action Taken: The IEPR panel recommended an assessment of future development that is likely to occur in West Sacramento and recalculate FRM benefits based on equivalent annual damages.

3. IEPR Comment – *Medium/High Significance*. Economic residual risks associated with seismic damage are not assessed.

The comment includes two recommendations for resolution which were not adopted as discussed below.

USACE Response (#1): Not Adopted

Action Taken: The IEPR panel recommended estimation of the probability of levee damage due to seismic shaking and the cost of subsequent repair. This recommendation was not adopted based on the following: The West Sacramento GRR has evaluated the probability of levee damage due to seismic shaking as detailed in Enclosure No. 6. Development of a conceptual design and cost estimate for seismic mitigation is commonly not completed as the probability of a concurrent flood event and an earthquake occurring is considered to be quite low.

USACE Response (#2): Not Adopted

Action Taken: The IEPR Panel recommended that based on the results of the above recommendation, consider whether it would be warranted to develop a conceptual design and cost estimates for improvements to resist seismic damage. This recommendation was not adopted based on the following: The West Sacramento GRR has evaluated the probability of levee damage due to seismic shaking as detailed in Enclosure No. 6. Development of a conceptual design and cost estimate for seismic mitigation is commonly not completed as the probability of a concurrent flood event and an earthquake occurring is considered to be quite low.

4. IEPR Comment – *Medium Significance.* The conclusions regarding seismic hazards in relation to the California Seismic Hazards Mapping Act in the Draft EIS/EIR are contradicted by the results of analyses presented in the Geotechnical Appendix to the GRR.

The comment includes two recommendations for resolution which were all adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended clarifying the discussion of seismic hazards presented in the Draft EIS/EIR (p. 67).

USACE Response (#2): Adopted

Action Taken: The IEPR panel recommended review of the conclusions related to the California Seismic Hazards Mapping Act in light of other descriptions of seismic risks (i.e., p. 67 of the EIS/EIR and the GRR, Appendix C, Section 12) and resolve any inconsistency.

5. IEPR Comment – *Medium Significance.* Decisions to upgrade the levee are sometimes based on qualitative criteria that are not clearly defined, potentially resulting in non-essential levee upgrades.

The comment includes two recommendations for resolution which were all adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended evaluating whether qualitative design criteria could be established and described to supplement the quantitative criteria.

USACE Response (#2): Adopted

Action Taken: The IEPR panel recommended performing additional investigations and analyses in future design stages to resolve inconsistencies between observed performance and results of analyses.

6. IEPR Comment – *Medium Significance.* The adequacy of the internal water management system and the incremental costs and benefits of improving the system have not been evaluated.

The comment includes two recommendations for resolution which were all adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended evaluating the design, existing condition, and operations and maintenance practices of the West Sacramento internal water management system to verify that the system is designed appropriately and will continue to function properly in the future.

USACE Response (#2): Adopted

Action Taken: The IEPR panel recommended evaluating the incremental costs and benefits of improvements to the internal water management system to determine whether such improvements are justified and could increase the total net FRM benefits of the recommended plan.

7. IEPR Comment – *Medium Significance.* The basis for the assumption that the project will receive funding for construction at a rate of \$100 million per year has not been provided, and the construction period may be too short, which would result in an underestimate of the cost of interest during construction.

The comment includes one recommendation for resolution which was adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended adding a description of the basis for the assumption that the project will receive \$100 million per year during the construction period. The project team determined that based on the conditions of the existing levees, the evaluation of the levees by the Levee Senior Oversight Group, and the potential consequences associated with a levee failure the project would receive optimal funding. The project team developed a schedule based on the anticipated time needed to construct each reach and availability of construction equipment. This schedule the project team developed had a total duration of 17

years. Standard practice is to assume optimal funding. If during construction, optimal funding does not keep pace, it will be reflected in the mandated Economic Updates which are required at least every three years. However, by policy, “interest during construction will only be calculated based on remaining construction costs and a schedule to complete that assumes optimum funding.” Based on this guidance a schedule delay will impact benefit-to-cost ratio (BCR) updates less significantly than if all interest during construction (IDC) was included.

8. IEPR Comment – *Medium Significance*. The mitigation requirements for the alternatives and the recommended plan are not described in the GRR and it is not clear whether the cost estimates include the cost of implementing and monitoring mitigation measures.

The comment includes two recommendations for resolution which were all adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended providing more detailed descriptions of the mitigation measures, how they will be implemented, and uncertainties related to implementation.

USACE Response (#2): Adopted

Action Taken: The IEPR panel recommended adding a discussion of how the cost estimates for mitigation measures and monitoring were developed, include a line item for mitigation measures and monitoring in the total project cost estimate, and discuss uncertainty.

9. IEPR Comment – *Medium Significance*. Baseline conditions for invasive plants in the project area, and an effects analysis for invasive plant spread as a result of project construction, have not been presented.

The comment includes two recommendations for resolution which were all adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended discussing existing conditions for invasive plants/noxious weeds in the project area. If recent field or other site-specific data to characterize invasive plant conditions in the project area are not available, then a summary of the expected or likely conditions there based on land cover types, levels of disturbance, and known invasive plant occurrences in nearby areas would be adequate.

USACE Response (#2): Adopted

Action Taken: The IEPR panel recommended adding a discussion of construction-related impacts in the effects analysis and considering whether mitigation to prevent invasive plant spread during construction is needed.

10. IEPR Comment – *Medium Significance.* Some biological resources in the study area potentially affected by project implementation have not been presented in sufficient detail to describe the existing conditions and support the EIS/EIR analysis.

The comment includes two recommendations for resolution which were both adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended preparing and adding Figures 3.6-1, 3.6-2, 3.6-3, 3.6-4, and 3.6-5 to the Draft EIS/EIR. These figures were added to the EIS.

USACE Response (#2): Adopted

Action Taken: The IEPR panel recommended adding a table that quantifies (in acres) and compare the amount of each land cover type, including waters of the United States, assumed to be affected under each alternative.

11. IEPR Comment – *Medium Significance.* Issues that are important to the integrity of the levee that may affect its future performance (such as poor soil composition, presence of any large trees at or near the levee, and the likelihood of animals burrowing the soil) have not been fully addressed.

The comment includes two recommendations for resolution which were adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended implementation of an active abatement or control program to remove any animals or large trees that are located at or near the levees.

USACE Response (#2): Adopted

Action Taken: The IEPR panel recommended adding a discussion of construction-related impacts in the effects analysis and considering whether mitigation to prevent invasive plant spread during construction is needed.

12. IEPR Comment – *Medium/Low Significance*. A strategy has not been presented for allocating costs and benefits for West Sacramento alternatives that might be integrated with the Locally Preferred Option being considered in the American River Common Features Project.

The comment includes three recommendations for resolution; two were not adopted and one was adopted as discussed below.

USACE Response (#1): Not Adopted

Action Taken: The IEPR panel recommended development and application of a strategy for allocating costs and benefits to the American River Common Features Locally Preferred Option and the West Sacramento Project alternatives, assuming both projects are authorized. USACE did not adopt this recommendation because neither the costs nor the benefits of the West Sacramento GRR and the American River Common Features GRR are shared. There are no features of the two projects that have shared costs. Each project is a stand-alone project. West Sacramento GRR Alternatives 2 and 4, which included the Sacramento Bypass widening, were not carried into the final array of alternatives, because they were not as cost effective as other alternatives. The District determined that because there is a limited amount of levee raising (approximately 5,000 ft. of levee) needed along the Sacramento River for the West Sacramento project, the more efficient option was to raise the levees in place to address that concern.

USACE Response (#2): Not Adopted

Action Taken: The IEPR panel recommended an assessment and documentation of the non-Federal sponsors' willingness to participate in plans that integrate the American River Common Features Locally Preferred Alternative with the West Sacramento recommended plan. USACE did not adopt this recommendation because neither the costs nor the benefits of the West Sacramento GRR and the American River Common Features GRR are shared. There are no features of the two projects that have shared costs. Each project is a stand-alone project. West Sacramento GRR Alternatives 2 and 4, which included the Sacramento Bypass widening, were not carried into the final array of alternatives, because they were not as cost effective as other alternatives. The District determined that because there is a limited amount of levee raising (approximately 5,000 ft. of levee) needed along the Sacramento River for the West Sacramento project, the more efficient option was to raise the levees in place to address that concern.

USACE Response (#3): Adopted

Action Taken: The IEPR panel recommended development of strategies for the West Sacramento Project based on future scenarios with and without authorization and construction of the American River Common Features Project.

13. IEPR Comment – *Medium/Low Significance*. It is not clear how evaluation metrics were used in screening preliminary alternatives or evaluating the final alternatives.

The comment includes one recommendation for resolution which was adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended a description of how the evaluation metrics in Table 3-18 were applied to the alternatives and how the alternatives compared. A table was added to compare how well each alternative met the planning objectives based on the evaluation matrix.

14. IEPR Comment – *Medium/Low Significance*. It is not clear how the magnitude of impacts and level of significance were determined for effects of sedimentation and turbidity on fisheries resources.

The comment includes two recommendations for resolution which were adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended to expand the discussion of anticipated project effects on fisheries resources and describe impact mechanisms and the types and magnitudes of biological effects. The discussion was added as suggested.

USACE Response (#2): Adopted

Action Taken: The IEPR panel recommended to discuss the assumptions made about the amount of project-related increased sedimentation and turbidity that would be considered substantial and therefore significant. The discussion was added as suggested.

15. IEPR Comment – *Medium/Low Significance*. Details about dates, locations, and objectives of reconnaissance-level surveys for some biological resources are not presented.

The comment includes one recommendation for resolution which was adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel recommended a discussion of the survey methods, including survey areas, dates, and types of information collected in Sections 3.6, 3.7, and 3.8 of the Draft EIS/EIR. A discussion was added to the EIS as suggested.

16. IEPR Comment – *Low Significance.* No analyses have been reported that confirm that the seepage model extent is sufficient so that boundary effects do not result in inaccurate results.

The comment included one recommendation for resolution which was adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel requested that the inferred assumption should be confirmed in future design phases either by analyzing a few cases with larger model extents and comparing results to confirm that exit gradients are the same, or by applying constant head boundary conditions on vertical surfaces with reasonably assumed piezometric levels.

17. IEPR Comment – *Low Significance.* **The use of effective peak shear strength parameters may not be appropriate for all materials.**

The comment included one recommendation for resolution which was adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: The IEPR panel requested that during future design phases, evaluate whether conditions exist where using undrained or fully softened strength parameters might affect details of recommended repairs. If necessary, perform lab tests or use applicable correlations to determine appropriate strength parameters for use in detailed design.

18. IEPR Comment – *Low Significance.* **The level of significance of impacts on biological resources after mitigation is not clearly presented.**

The comment included four recommendations for resolution which were adopted as discussed below.

USACE Response (#1): Adopted

Action Taken: For the biological resources impact discussions presented in Sections 3.6, 3.7, and 3.8 of the Draft EIS/EIR (pp. 114-124, 131-135, 168-185), include a conclusion about whether all potentially significant effects have been reduced to a less-than-significant level, and

which (if any) have not. For consistency, this revision could be made to all of the resource sections.

USACE Response (#2): Adopted

Action Taken: The IEPR panel requested the review of and, if needed, revision to Tables ES-1 and 4-2 to make them consistent with the analysis conclusions for biological resources.

USACE Response (#3): Adopted

Action Taken: The IEPR panel requested that details of the proposed mitigation for impacts on special-status bat species (e.g., survey methods, limited operating periods, minimization/avoidance measures, etc.) are provided.

USACE Response: (#4) Adopted

Action Taken: The IEPR panel requested that the cumulative effects discussion (pp. 384-387) be expanded to include a discussion of the projects contribution to a cumulative effect and its level of significance. For consistency, this revision could be made to all of the resource sections.